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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,103	03/26/2004	Thomas E. Owen	090936.0505	8037

31625 7590 05/17/2005

BAKER BOTTS L.L.P.
PATENT DEPARTMENT
98 SAN JACINTO BLVD., SUITE 1500
AUSTIN, TX 78701-4039

EXAMINER

SIEFKE, SAMUEL P

ART UNIT	PAPER NUMBER
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1743

DATE MAILED: 05/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/810,103	Applicant(s) OWEN ET AL.	
	Examiner Samuel P. Siefke	Art Unit 1743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
 4a) Of the above claim(s) 14-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>7/9/04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-13, drawn to a method of determining the amount nitrogen in a gas mixture, classified in class 436, subclass 114.
- II. Claims 14-15, drawn to method of reforming a gas mixture to produce ammonia, classified in class 436, subclass 113.
- III. Claims 16-20, drawn to detecting the amount of triatomic molecular nitrogen ion, classified in class 436, subclass 106.
- IV. Claims 21-24, drawn to optical detection of nitrogen, classified in class 436, subclass 164.

The inventions are distinct, each from the other because of the following reasons:

Inventions Group II and Group I are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because reforming a gas mixture to produce ammonia can be accomplished by reacting a hydrocarbon such as methane with superheated steam in the presence of a suitable catalyst. The

subcombination has separate utility such as reforming a gas mixture in a thermal electrical arc.

Inventions Group II and Group III are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because reforming a gas mixture to produce ammonia can be accomplished by reacting a hydrocarbon such as methane with superheated steam in the presence of a suitable catalyst. The subcombination has separate utility such as dissociating nitrogen by bombarding nitrogen using a beta emitting radioactive source.

Inventions Group III and Group IV are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because hydrogen may be supplied to the reactor in a pure form and not as a hydrocarbon. The subcombination has separate utility such as supplying pure hydrogen to nonthermal plasma reaction chamber.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Ann Livingston on April 25, 2005 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-13. Affirmation of this election must be made by applicant in replying to this Office action. Claims 14-24 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The step of dissociating nitrogen atoms is unclear and indefinite because it is unclear what nitrogen atoms are being dissociated. Further

it is unclear during the associating step what nitrogen atoms and hydrogen atoms are being associated. It is unclear as to how many steps are performed in the method.

Does the dissociating and associating happen all at once? The claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claims 1-13 are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Further it is unclear as to how the nitrogen amount is determined by measuring the ammonia.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 7, 12 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Jordan (USPN 2,894,821).

Jordan discloses a method for the control of nitrogen in ammonia synthesis. The method comprises a continuous process control of nitrogen content in ammonia synthesis gas. The nitrogen content of feed gas to an ammonia synthesis process is continuously controlled by regulation of the volume of air introduced to the secondary reformer. In the process for manufacturing ammonia the first step is usually that of producing a feed gas containing, 3 parts hydrogen for each part of nitrogen. This is accomplished by reacting a hydrocarbon such as methane as may be found in natural gas with superheated steam in the presence of a suitable catalyst. This reaction takes place in a primary reformer. The effluent from this reaction comprising hydrogen, carbon monoxide, carbon dioxide, and methane and is then passed to a secondary reformer to which is also added a sufficient quantity of air which, after the oxygen is removed in the form of oxygen containing compounds, provides the correct proportion of nitrogen. The effluent from the second reformer is then passed to a shift converter for conversion of most of the carbon monoxide to carbon dioxide. Suitable means are then used for removing the steam such as a water quench. Such treatment leaves a product gas containing primarily hydrogen and nitrogen. This gas, which is the feed for ammonia production, is passed to an ammonia converter at an elevated pressure where it is converted in the presence of a suitable catalyst to ammonia. The effluent gas from such conversion or synthesis is passed through suitable equipment for removal of ammonia such as conventional cooling and refrigerating equipment. After the removal of the ammonia, the remaining gas will still contain some hydrogen and nitrogen along with minor quantities of methane and the previously mentioned inert gases which are

now in greater proportions than in the feed gas because of the removal of some of the hydrogen and nitrogen as ammonia. Jordan discloses the feed gas to ammonia synthesis contains a hydrogen and nitrogen in a ratio of 3 to 1. From this one can calculate the nitrogen amount in the gas. Further Jordan continuously controls the overall ratio of nitrogen to hydrogen in the feed gas to ammonia synthesis by the determination of the hydrogen and/or nitrogen content or the hydrogen-nitrogen ratio of the cycle or feed gas, and by such determination controlling the air feed to the second reformer which is the source of nitrogen.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 4, 5, 6, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jordan (USPN 2,894,821) in view of Vogtlin et al. (USPN 5,711,147).

Jordan discloses a method for the control of nitrogen in ammonia synthesis by steam reforming process.

Jordan does not teach a method for ammonia production by nonthermal plasma discharge unit.

Vogtilin teaches a gas treatment by the use of a nonthermal plasma unit. It would have been obvious to one having an ordinary skill in the art to modify the method of Jordan to employ a nonthermal plasma discharge unit in order to provide the energy needed for dissociating and associating nitrogen and hydrogen for ammonia synthesis because nonthermal plasma energy is more efficient and provides a safer working environment than the steam reformer of Jordan.

Claims **8-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Jordan (USPN 2,894,821) in view of Faulhaber et al. (USPN 4,390,785).

Jordan discloses a method for the control of nitrogen in ammonia synthesis as discussed above.

Jordan does not teach using infrared absorption techniques for the measurement of ammonia.

Faulhaber teaches a method for remotely detecting gases in the atmosphere where an infrared absorption of ammonia is detected. Infrared absorption peaks are located at exactly the same wavelengths in a chemical compound's spectrum as its infrared emission peaks. Methane has an infrared spectrum which contains a series of very sharp peaks between 7.2 and 8.2 micrometers. All of those peaks can be selected for the identification of methane. Other gases which have well defined infrared

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absorption or emission regions include, for example, ammonia, ethylene, propane, sulfur dioxide, and water (col. 2, lines 4-16). Therefore it would have been obvious to one having an ordinary skill in the art to modify Mullis to employ an infrared absorption unit to detect ammonia in gases because it provides precise measurements and identification of an exhaust gas. It is well known that ammonia has a sharp peak at 10.34 and 10.74 micrometers and would have been obvious to one having an ordinary skill in the art to monitor these peaks when detecting for ammonia in a gas mixture.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel P. Siefke whose telephone number is 571-272-1262. The examiner can normally be reached on M-F 7:00am-5:00pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on 571-272-1700. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sam P. Siefke

A stylized, handwritten signature consisting of several overlapping loops and curves.

May 12, 2005

A handwritten signature in cursive script, appearing to read 'Jili Warden'.

Jili Warden
Supervisory Patent Examiner
Technology Center 1700